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Report on Impressions of Scientific Work in Goettingen and Hamburg, Germany--July, 1947

by N. Artin and R. Courant

The short duration of our stay in Germany made it impossible to go more deeply into the scientific work with which we came in contact. The following lines may, however, give some specific impressions in addition to our more general report and to the report concerning computing machines.

As stated in the general report, scientific life in Germany is largely paralyzed and at best spotty. Many scientists of past achievements are all but inactive for psychological reasons and, perhaps even more, because of the disastrous effects of the material conditions. However, there exists active scientific life in some more fortunate centers.

As far as we could ascertain, Goettingen is the most outstanding of them. As a matter of fact, if the general situation in Europe should be re-established to some state of equilibrium, then Goettingen has a good chance of becoming again one of the great international scientific centers. This opinion is based on various facts: Goettingen and its academic institutions have remained almost unscathed by the war, except that important parts of the libraries were destroyed by fire in unsafe storage places where they had been taken by the Nazis for safekeeping.

The geographical location of Goettingen in a rural district makes it easier for many people to obtain additional food.

Because of these conditions and because of the farsighted policy of the British, Goettingen became after the war a favorite refuge for scientists, who greatly augmented and strengthened the excellent permanent staff of the University. Among the newcomers are Otto Hahn, Heisenberg, von Laue, von Weitzaecker, and many others. The British Military Government made Goettingen the seat of the headquarters of the Scientific Branch; of which Brigadier Spedding is an excellent and competent military head and Dr. Fraser an unselfish civilian director, who combines scientific competence with energy, administrative ability, and understanding for the German scene. British policy is to re-establish Goettingen to its old standards. The British very actively support the re-organization of various former Kaiser Wilhelm Institutes in Goettingen under the directorship of Otto Hahn. It was therefore not surprising to find in Goettingen a relatively unbroken scientific spirit, even though the actual present situation still is under a depressing cloud. Lack of food, housing, books, contacts, and equipment still has a very disturbing and irritating influence. Within the scientific group at Goettingen we found a relatively large number, maybe even a majority, of people whose general political and human attitude seemed all right, and moreover a few men such as von Laue for whose courage and honesty one can have only the greatest admiration.

Among the scientific personalities in Goettingen, we mention Professor Rein, Rector of the University, an excellent physiologist with a good political record, who is trying to steer the University along a reasonable course

through the troubled times. Professor Eucken, physical chemist, until recently Dean of the Science Faculty, was apparently not an active supporter of the Nazis. The Physics Department of the University is dominated by Professor R. Pohl, who has not much changed since 1933 and is directing an active group of younger people who work with resourcefulness and apparently with almost sufficient resources. Pohl's well-known facilities and techniques for demonstrating physical experiments to large audiences are still unequalled.

While Pohl works mostly in classical physics, the Second Physical Institute, under Professor Kopfermann (a pupil of James Franck), is interested in atomic physics. The Third Physical Institute, under Professor Erwin Meyer, formerly Director of the Heinrich Hertz Institute in Berlin, is vigorously engaged in work on technical physics. Theoretical physics is under Richard Becker, who has now given up his work on gas dynamics and seems to be generally more depressed than the others.

In the Kaiser Wilhelm Institutes, Hahn as well as von Laue is largely absorbed by administrative problems and by general worries about reconstruction of scientific life. Heisenberg is by far the most important and most vital center of activity. Not only is he engaged in his theoretical work on cosmic rays and nuclear physics, but he also directs a small experimental institute; what is more specifically interesting for our Navy contract, he has resumed his former work on fluid mechanics. Together with Weitzaecker, he has worked on turbulence along lines not dissimilar to those pursued independently by G. I. Taylor and his group in Cambridge, England, and by Kolmogoroff in Moscow. We have obtained a manuscript by Heisenberg which, together with English and Russian work, will be studied and evaluated here by Dr. Eberhard Hopf.

Ludwig Prandtl's work on gas dynamics and that of his Institute is still impeded by Military Government regulations. However, Prandtl has taken up work on dynamic meteorology. A short report, of which we brought a draft with us, will soon be published by the Goettingen Academy. Studying and following up his methods for computing initial value problems of meteorology may become useful for the problem of weather prediction. Prandtl has developed a convergent iteration scheme for computing the simplest non-trivial initial value problem of meteorology, in which the Cariolis forces play a predominant role.

In the field of mathematics proper, the situation is not as favorable as in physics. By and large, the mathematicians seem to be less vigorous and more run-down than the physicists. However, the Director of the Mathematics Institute, Professor Franz Rellich, is one of the best and strongest personalities in the science faculty and an excellent leader for his small group. He himself is still working actively on the spectral theory of linear operators in a direction rather closely related to work done in New York University. His work has potential significance for quantum physics, in particular as far as the theory of perturbation is concerned. Also of great interest to us is Rellich's work on partial differential equations, in particular on the problem of uniqueness of solutions, a problem whose significance for gas dynamics is becoming more and more apparent.

Perhaps of greatest specific interest from the point of view of work sponsored by the Navy are the activities of Professor W. Magnus. During recent years he and some of his collaborators have done a great deal of mathematical research on wave propagation, in particular electromagnetic

waves and wave guides. In an appendix to this report, a more detailed description of Magnus' work is included. Magnus had been brought over to England for several visits of a few weeks, and it seems well worth considering whether some contact with him should be established, for example through the ONR office in London, with a view to having him work for ONR either in Germany or, temporarily, in this country. As a personality he seems ideally suited for cooperation with American scientists. He had been a year or more in Princeton and would have returned to the States for good had the war not prevented it.

It should also be mentioned that the groups in Goettingen which during the war worked so intensively on gas dynamics are now scattered, but that there are still some people in Goettingen with knowledge which deserves more exploitation. In particular, we met Professor Doering, whose work on detonation is not yet fully known in this country and, unfortunately, not yet published either. For example, he did theoretical work on the determination of the equation of state of solid explosives by observations of detonation velocities under varying conditions.

We also came across some work on shock wave computations by a younger man, Dr. Stellmacher, who in addition has done interesting work on the theory of Huygen's principle.

It should not be difficult to make arrangements with the group in Goettingen which would be beneficial for work in this country and at the same time bring some advantages to scientists in Goettingen. For example, there exists a treasure of handwritten and typewritten lecture notes in the Goettingen Mathematical Institute. Some of these notes could be copied for American institutions. Furthermore,

it would be easy to employ, as the British do, some Germans in Germany for certain scientific tasks. Goettingen would provide a relatively large reservoir of talent for such purposes. As compensation for such work, payment in valueless German currency would be unattractive; but payment in the form of food, books, and other supplies would probably have a great effect. Any contacts in Goettingen would preferably have to be established and maintained through the British authorities; that means through Dr. Fraser's office. It also might be quite worth while for some younger American scientists connected with government research to spend a few months in Goettingen and to study more closely phases of the scientific work there. We are sure that such visits would be welcomed by the German scientists on the one side and by the British administration on the other.

Another potentially strong center seems to be Hamburg. Unlike Goettingen, the University of Hamburg suffered very much material damage during the war. Many Institutes were completely destroyed and the main building burned out during the bombing. But reconstruction is already going on and the University has again a very high enrollment.

Dr. Heckmann, astronomer, is Dean of the Science Faculty. His time right now is mainly consumed by administrative duties. But he is very much interested in the printing of a 15-volume catalogue of the AG Zones, which is practically impossible without help from abroad on account of the complete lack of paper. The printing of these 15 volumes alone would require 20 tons of paper (approximately the yearly official allotment of the big publishing firm Julius Springer).

Dr. Harteck, who is in charge of the Physico-chemical Institute, is probably the most energetic person in the

University of Hamburg. After having been Dean last year, he now puts all his energy into the reconstruction of his Institute, which seems to be the only institute in Hamburg, maybe even in all of Germany, that is again in practically perfect condition.

The situation in the Mathematics Department is a little difficult to evaluate. There, in addition to Zassenhaus and Maack, Blaschke and Witt are back in their positions, both of whom had been originally suspended because of their connections with the Nazi regime.

Zassenhaus is very much interested in applied mathematics and has created in Hamburg a "Forschungsstelle für Angewandte Mathematik." He is very willing to give any kind of cooperation to American institutions and suggested that they would appreciate research assignments from American organizations in applied mathematics. A little awkward in his behavior, he seems to have had small undeserved difficulties.

We would strongly suggest that any contacts with mathematics in Hamburg should be made through Zassenhaus and Maack, both of whom are thoroughly competent and completely reliable.

In spite of lack of material and printing facilities, Hamburg University has started two new journals: Mathematische Forschung and Physicalische Forschung. Each of these journals will have ten issues yearly with 100 pages each. P. Jordan edits the physical journal, Blaschke the mathematical. Both of these journals are being published by a publishing company in Wolfenbüttel: Wolfenbüttler Verlagsanstalt. This same publishing company also publishes some new books, among them a book on projective geometry by Blaschke.

Of great interest in Hamburg is the newly created photostatic laboratory. It is the biggest institution of

its kind in the British Zone, with a capacity of 100,000 sheets of paper every month. Of course this capacity has to remain unused, as the largest amount of photostatic paper they could ever obtain was 25,000 sheets a month. This laboratory is installed in the basement of the Mathematics Department. Their work is extremely good and consists mainly of making copies of unavailable books that are needed for the use of students. As Hamburg's libraries have suffered very much, not only by fire but also by theft, the need of photostatic copies of all kinds of textbooks is great.

Our stay in Hamburg was also used for discussions with Dr. Günther Diedrich, an engineer who had a large part of the scientific responsibility for the construction of the German V-1. It seems quite possible that Diedrich's help can be advantageously utilized in the Project Squid under ONR. A preliminary memorandum by Diedrich has been transmitted to Squid, and steps have been initiated to bring about Diedrich's active cooperation.

There was not enough time to explore the situation in Berlin, where certainly conditions are very much more complex than in the western zones. The Russians are essentially in control of the University and the Prussian Academy and are making strong efforts to attract cooperation from first-rate German scholars. These efforts must not be dismissed as ineffective. Apparently the British have all but given up the idea of balancing Russian influence on science in Berlin. At least their active support of Goettingen is meant partly as a more promising counterbalance. The American plans for an institute for advanced study centered around the Kaiser Wilhelm Institutes in Berlin seem to be still vague and unrealistic. We found strong opposition to such plans among British

and American administrators as well as among responsible German scientists. There is a widespread feeling that scientific efforts within the western zone will be more effective.

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